

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

7/4/05

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/004245

International filing date (day/month/year)
06.10.2004

Priority date (day/month/year)
06.10.2003

International Patent Classification (IPC) or both national classification and IPC
F02M61/18

Applicant
DELPHI TECHNOLOGIES, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

16 Aug 05

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**International application No.
PCT/GB2004/004245

AP20 REG. CH. 15 APR 2006

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/004245

Box No. II Priority

1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
- ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
4. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-12
Inventive step (IS)	Yes: Claims	
	No: Claims	1-12
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

PCT/GB2004/004245

IAP20 Rec'd PCT/PTO 05 APR 2006

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Independent Claim

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

The document US 6 427 932 B1 (D1) discloses in Fig. 1,5 (see also col. 5, l. 53 to col. 6, l. 18): an injection nozzle for an internal combustion engine, the injection nozzle comprising:

- a nozzle body 14 provided with a bore defining a valve seating surface 16 having a seat cone angle α_1 ;
- a valve member 31 which is moveable within the bore,
- wherein the valve member 31 includes an upstream seat region 321,322,323 defining an upstream cone angle (45°), the upstream cone angle and the seat cone angle α_1 together defining a first differential angle between them, and a downstream seat region 33,39 defining a downstream cone angle α_2 , the downstream cone angle α_2 and the seat cone angle α_1 together defining a second differential angle between them,
- the valve member 31 further comprising a protruding annular ridge 320 intermediate the upstream seat region 321,322,323 and the downstream seat region 33,39, wherein the protruding annular ridge 320 defines a seating line (between 323 and 33) having a seat diameter, the seating line being engageable with the valve seating surface 16 to control fuel injection from the nozzle body 14.

angular
ridge is
whole
in D1

NO

NO
WA

The subject-matter of claim 1 is therefore not new (Article 33(2) PCT).

The meaning of the term "ridge" is quite broad and has been interpreted has
(stands proud of the surface
of the valve needle surface)

Each of the documents DE 100 00 501 A (D2), DE 101 22 503 A (D3), WO 02 01065 A (D4), WO 02 36961 A (D5) and US 6 565 017 B1 (D6) shows also all the features of claim 1.

2. Dependent Claims

Dependent claims 2-6, 8-12 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty. The additional features of these claims are also disclosed in D1 (for claims 2-4, 6 and 8-12), in D2 (for claims 2-4, 6 and 10-12), in D3 (for claims 2-4, 6 and 10-12), in D4 (for claims 2, 4, 5, 8 and 10-12), in D5 (for claims 2-4, 6 and 9-12) or in D6 (for claims 2-5 and 8-12).

Re Item VII

Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1 is not mentioned in the description, nor is this document identified therein.

The document EP 107 90 95 A cited in the description does not appear to be related to the subject-matter of the present application.

Re Item VIII

Certain observations on the international application

Claim 7 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not defined. The claim attempts to define the subject-matter in terms of the result to be achieved. Such a formulation is not allowable because it appears possible to define in term of technical features the relationship between both differential angles in order to maintain the seat diameter at a substantially constant value.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P11377WO/JSH	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/GB2004/004245	International filing date (day/month/year) 06/10/2004	(Earliest) Priority Date (day/month/year) 06/10/2003
Applicant DELPHI TECHNOLOGIES, INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regards to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 2a, 2b

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F02M61/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC 7 F02M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 427 932 B1 (DANCKERT BERND ET AL) 6 August 2002 (2002-08-06) column 5, line 53 - column 6, line 18; figures 1,5	1-4,6, 8-12
X	DE 100 00 501 A (BOSCH GMBH ROBERT) 19 July 2001 (2001-07-19) column 2, line 13 - column 3, line 53; figures 1-3	1-4,6, 10-12
X	DE 101 22 503 A (BOSCH GMBH ROBERT) 21 November 2002 (2002-11-21) paragraph '0012! - paragraph '0023!; figure 1	1-4,6, 10-12



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

21 December 2004

Date of mailing of the international search report

07/01/2005

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Authorized officer

Godrie, P

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/01065 A (BOSCH GMBH ROBERT ;HOCKENBERGER AXEL (DE)) 3 January 2002 (2002-01-03) page 4 - page 7; figures 1,2 ----- PCT	1,2,4,5, 8,10-12
X	WO 02/36961 A (HOFMANN THOMAS ;PERRAS ALWIN (DE); SIEMENS AG (DE); YALCIN HAKAN () 10 May 2002 (2002-05-10) page 2, line 28 - page 7; figures 1,2 ----- PCT	1-4,6, 9-12
X	US 6 565 017 B1 (FRANK WILHELM ET AL) 20 May 2003 (2003-05-20) column 5, line 12 - line 50; figure 4 -----	1-5,8-12

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6427932	B1	06-08-2002	DE 19820513 A1	11-11-1999
			DE 59902943 D1	07-11-2002
			WO 9958844 A1	18-11-1999
			EP 1076772 A1	21-02-2001
DE 10000501	A	19-07-2001	DE 10000501 A1	19-07-2001
			WO 0151804 A2	19-07-2001
			EP 1181445 A2	27-02-2002
			JP 2003519756 T	24-06-2003
			PL 350824 A1	10-02-2003
			US 2003057298 A1	27-03-2003
DE 10122503	A	21-11-2002	DE 10122503 A1	21-11-2002
			CN 1462342 T	17-12-2003
			WO 02090761 A1	14-11-2002
			EP 1387950 A1	11-02-2004
			JP 2004519604 T	02-07-2004
			PL 358462 A1	09-08-2004
			US 2004056118 A1	25-03-2004
WO 0201065	A	03-01-2002	DE 10031265 A1	10-01-2002
			BR 0106897 A	30-04-2002
			CN 1383470 T	04-12-2002
			WO 0201065 A1	03-01-2002
			EP 1297252 A1	02-04-2003
			JP 2004502074 T	22-01-2004
			PL 352573 A1	25-08-2003
			US 2002162906 A1	07-11-2002
WO 0236961	A	10-05-2002	DE 10054183 A1	29-05-2002
			WO 0236961 A1	10-05-2002
			EP 1332283 A1	06-08-2003
			US 2003213459 A1	20-11-2003
US 6565017	B1	20-05-2003	DE 19931891 A1	18-01-2001
			FR 2796103 A1	12-01-2001